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THE THREAD-LEGGED ASSASSIN BUG GENUS *CALPHURNIOIDES* DISTANT (HEMIPTERA: HETEROPTERA: REDUVIIDAE) FROM EASTERN JAVA AND BALI, INDONESIA

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Abstract.—Three assassin bug species of the emesine genus *Calphurnioides* Distant are reported from eastern Java and Bali, Indonesia. ***Calphurnioides conjunctus* Ishikawa and Okajima, n. sp.**, is described and illustrated, and two previously known species, *C. emmesius* (McAtee and Malloch) and *C. velutinervis* (McAtee and Malloch), are recorded there for the first time and diagnosed with habitus photos.

Key Words: Heteroptera, Reduviidae, Emesinae, Ploiariolini, *Calphurnioides*, Indonesia

The genus *Calphurnioides* Distant belongs to the tribe Ploiariolini of the assassin bug subfamily Emesinae and is represented by ten described species (Wygodzinsky 1966, Maldonado Capriles 1990, Ishikawa and Yasunaga 2004). This genus has been reported so far from the tropical and subtropical Ethiopian, Oriental, and Australian regions (Wygodzinsky 1966, Maldonado Capriles 1990), with one species known from temperate zone of Japan (Ishikawa and Yasunaga 2004).

Recently, we obtained approximately 40 specimens of *Calphurnioides* from eastern Java and Bali, Indonesia, from where there is no published record of the genus. These specimens were found to represent one undescribed species and two previously known ones, *C. emmesius* (McAtee and Malloch) and *C. velutinervis* (McAtee and Malloch). Here we describe and illustrate the new species, and record the other species from Java and Bali for the first time. Photos of the habitus are provided for all species.

The type material is housed in the Laboratory of Entomology, Faculty of Agriculture, Tokyo University of Agriculture, Atsugi-shi, Kanagawa, Japan. A pair of paratypes is preserved in both the American Museum of Natural History, New York, U.S.A., and the Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A.

Calphurnioides Distant

Calphurnioides Distant 1913: 164. Type species: *Calphurnioides elongatus* Distant 1913. Subsequent designation by Wygodzinsky (1966).

Pseudobolos McAtee and Malloch 1926: 119 (as a subgenus of *Emesopsis* Wolff 1811, synonymized by Wygodzinsky 1966). Type species: *Emesopsis (Pseu-*

dobolos) velutinervis McAtee and Malloch 1926. Original designation.
Pseudobolos: Wygodzinsky 1954: 571 (as n. stat.).

Diagnosis.—Distinguished from other genera of the tribe Ploiariolini by a combination of the following characters: Body shining, almost uniformly yellowish or brownish; scutellum lacking spine; metanotum armed with a long spine; hemelytron having a single discal cell and one longitudinal stripe along outer margin on basal half (submarginal stripe); two longitudinal veins (M and Cu) extend from base of discal cell; and discal cell of hemelytron more than twice as long as its maximum width, with apical part narrowed conspicuously. Wygodzinsky (1966) provided a detailed description.

Habitat.—Most specimens of the species mentioned in this paper were collected from dead leaf clusters of banana trees in Java and Bali, Indonesia.

Calphurnioides conjunctus Ishikawa and Okajima, new species

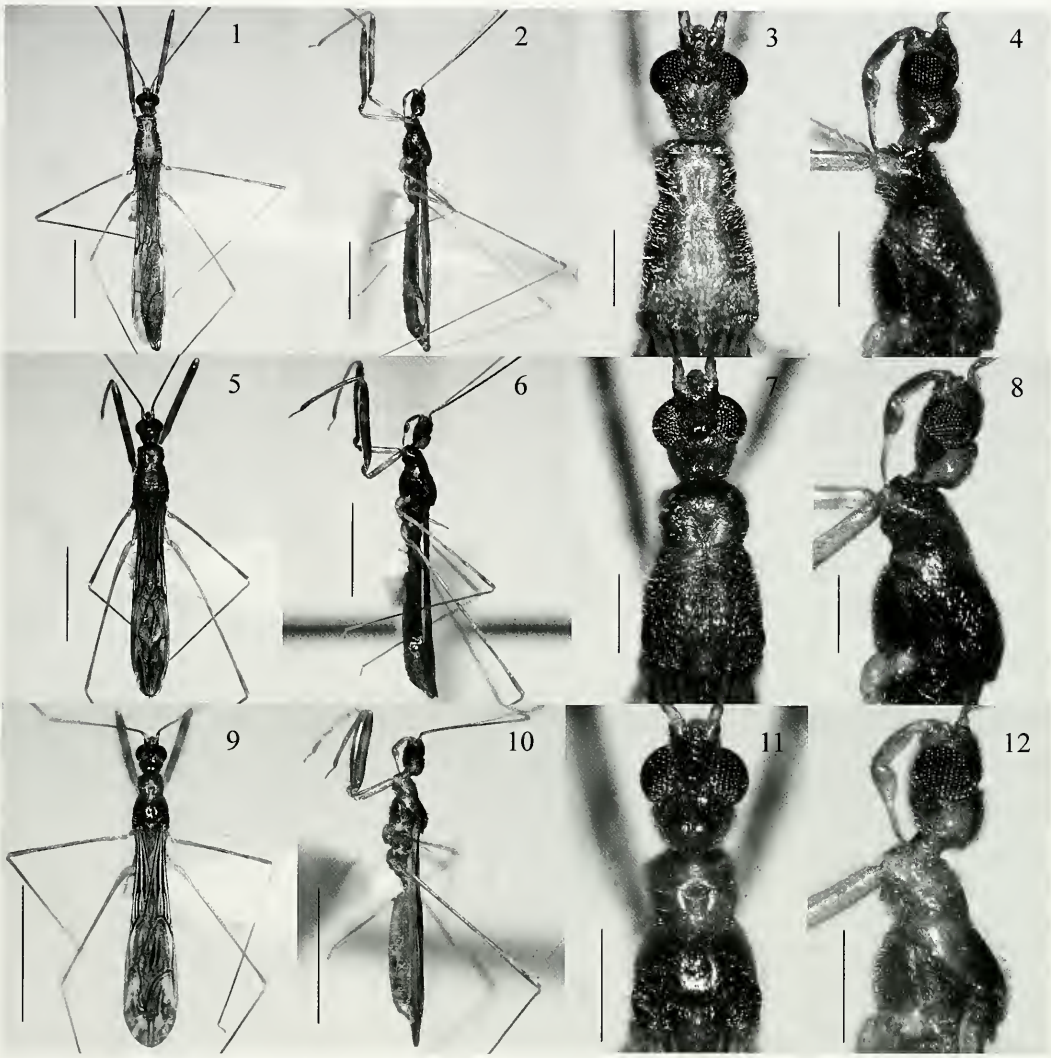
(Figs. 1–4, 13, 14, 19–30)

Diagnosis.—This species is recognized by a combination of the following characters: body yellowish brown, with pronotal disc brownish yellow; mesopleuron dark brown; pronotum 1.6 times as long as head and 1.6 times as long as humeral width (Figs. 3–4); profemur brownish yellow, with four brownish annulations (Fig. 2); submarginal stripe of hemelytron connected to veins M and Cu by short veinlike markings (Figs. 13–14); discal cell with one longitudinal brownish stripe (Fig. 13); endosoma of phallus with two pairs of membranous expansions in addition to a pair of vesica arms (Figs. 28–29); and vesica arm long and slender, curved ventrad in apical one-third (Figs. 28–29).

Description.—Male (holotype): *Color:* Body generally yellowish brown. Mesopleuron dark brown. Dorsum of posterior lobe of head and disc of pronotum brownish yellow. Rostral segment III, supracoxal areas, and metanotal spine pale yellow. Foreleg brownish yellow, with brownish annulations on basal one-tenth, basal two-fifths, apical one-fourth and apical one-tenth of femur and on middle of tibia (Fig. 2); trochanter and apical part of tibia dark brown; tarsus and apical one-third of coxa brownish. Femora of mid- and hind legs pale yellow, with brownish annulations on middle, apical one-third and apical one-tenth of mesofemur; apices of meso- and metafemora yellowish brown; tibiae and tarsi of mid- and hind legs brownish yellow. Hemelytron (Figs. 13–14) transparent, iridescent, weakly tinged with brown, mottled with 2 brown spots between veins M and Cu before base of discal cell, one of these connecting veins M and Cu; submarginal stripe (Figs. 13–14, ss) dark brown, connected to veins M and Cu by 1 and 2 short veinlike markings, respectively; discal cell (Fig. 13, dc) with one slender, longitudinal, brownish stripe; veins yellowish brown to brown. Abdomen yellowish brown, weakly tinged with red laterally, and with connexiva pale yellow.

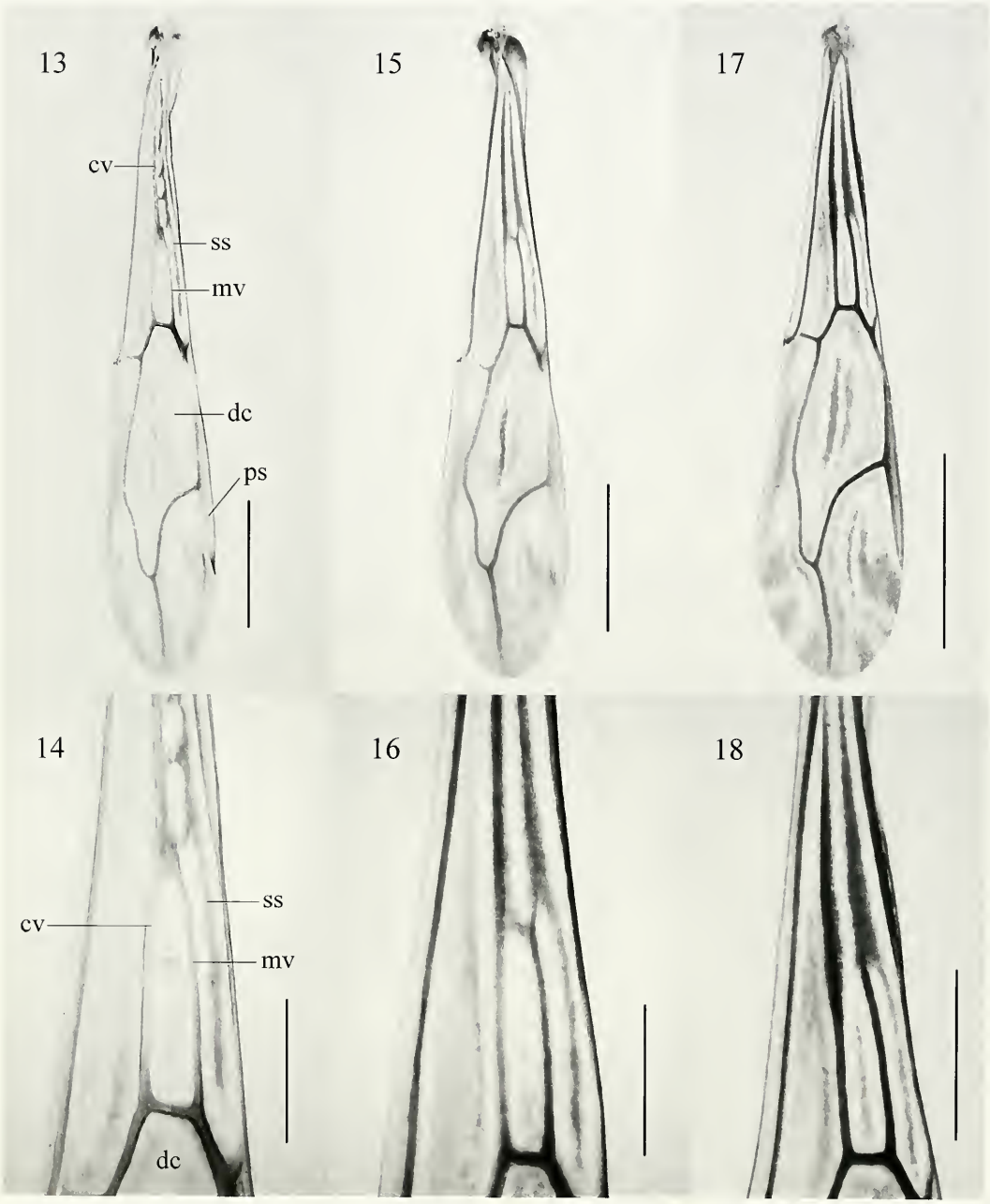
Head (Figs. 3–4): Elliptical, 1.2 times as long as width across eyes, covered with short, decumbent and suberect setae; anteoculus 0.6 times as long as postoculus. Eyes (Figs. 3–4) large, just reaching level of ventral surface of head in lateral view (Fig. 4), as wide as interocular space in dorsal view (Fig. 3). Antenna covered with short, decumbent setae; approximate proportion of segments I to IV as 5: 4: 2: 1. Rostrum covered with short, curved setae; approximate proportion of segments I to III as 17: 10: 13.

Thorax: Pronotum (Figs. 3–4) 1.6 times as long as head, 1.6 times as long as humeral width, covered with short and long erect setae except disc of



Figs. 1–12. Males of *Calphurnioides* spp. 1–4, *C. conjunctus*, holotype. 5–8, *C. enmesius*. 9–12, *C. velutinervis*. 1, 5, 9, Habitus, dorsal view. 2, 6, 10, Habitus, lateral view. 3, 7, 11, Head and prothorax, dorsal view. 4, 8, 12, Head and prothorax, lateral view. Scales: 2.0 mm for 1–2, 5–6, 9–10; 0.5 mm for 3–4, 7–8, 11–12.

anterior lobe with decumbent setae; anterior lobe 0.85 times as long as its maximum width, with lateral margins roundly expanded; posterior lobe transversely rugose, roughly punctate, 1.6 times as long as anterior lobe, as long as humeral width; posterior margin roundly concave at middle. Metanotal spine straight, 0.9 times as long as humeral width. Foreleg (Fig. 19) covered with sparse, long, erect setae on coxa and with dense, short, decumbent setae on femur, tibia, and tarsus; trochanter and femur ventrally covered with dense, short to long erect setae; coxa about 8 times as long as its maximum width; femur twice as long as coxa, about 11 times as long as its maximum width, with anteroventral and posteroventral series of about 40 small to medium-sized spines each; tibia slightly curved, about 0.8 times as long as femur, ventrally with 2 series of about



Figs. 13–18. Right hemelytron of *Calphurnioides* spp. (14, 16, 18, around basal one-third). 13–14, *C. conjunctus*. 15–16, *C. enmesius*. 17–18, *C. velutinervis*. Abbreviations: cv, Cu vein; dc, discal cell; mv, M vein; ps, pterostigma; ss, submarginal stripe. Scales: 1.0 mm for 13, 15, 17; 0.4 mm for 14, 16, 18.

40 appressed, strong setae; tarsus 0.2 times as long as tibia. Mid- and hind legs covered with short, decumbent setae. Hemelytra (Fig. 20) scarcely reaching posterior apex of abdomen, not covering apical parts of parameres and posterior process of pygophore; vein M free from vein Cu before base of discal cell

(Fig. 20, cv, mv); apex of pterostigma (Fig. 20, ps) slightly exceeding distal end of discal cell.

Abdomen: Sparsely covered with long, suberect setae intermixed with dense, short, decumbent setae.

Male genital structure (paratypes): Pygophore excluding posterior process twice as long as its height, triangularly projected posteriad at distal end of each side of pygophore in lateral view (Figs. 22–23); posterior process (Figs. 22–23, pp) large, narrowed apicad, with apex acute in lateral view and rounded in ventral view. Paramere (Figs. 24–25) laterally compressed, hooked in apical part, acute at apex in dorsal view, covered with erect setae variable in length in apical half. Phallosoma of phallus uniformly sclerotized, apically with ventral projection; ventral projection (Fig. 30, vp) about 8 times as long as its maximum width. Endosoma (Figs. 28–29) with 2 pairs of membranous expansions in addition to a pair of vesica arms; vesica arm (Figs. 28–29, va) long and slender, weakly sclerotized ventrally, gently bent dorsally at middle, curved ventrad in apical one-third; membranous expansions one-third as long as vesica arm; outer expansion (Figs. 28–29, oe) acute at apex; inner expansion (Figs. 28–29, ie) slightly exceeding apex of outer expansion, obtuse at apex.

Female (paratypes): In general appearance, almost similar to male. Hemelytron slightly exceeding posterior apex of abdomen. Valvifer I (Fig. 26, vf1) about twice as long as basal width, acute at apex; valvula I (Fig. 26, vl1) apically rounded. Styloides (Fig. 27) V-shaped, with posterior margin rounded.

Measurements (holotype; in mm): Body length 6.87 [paratypes: 6.50–6.90 in male (n=5), 6.55–6.80 in female (n=5)]. Head length including neck 0.77; width across eyes 0.64; interocular space 0.22. Antenna length 7.91; lengths of segments I, II, III and IV 3.25, 2.74, 1.25 and 0.67. Rostrum length 0.92; lengths of segments I, II and III 0.39, 0.23 and 0.30. Pronotum length 1.20; width across humeri 0.74. Hemelytron length 4.90. Lengths of femur, tibia, and tarsus of foreleg 2.04, 1.65 and 0.30; of midleg 3.20, 4.30 and 0.22; of hind leg 4.80, 6.60 and 0.22, respectively. Abdomen length 4.38.

Holotype.—♂ (Figs. 1–4, 19), Tumpang, Malang, Java, Indonesia, 8°01′39″S, 112°46′26″E, ca 690 m alt., 22. VIII. 2005, T. Ishizaki.

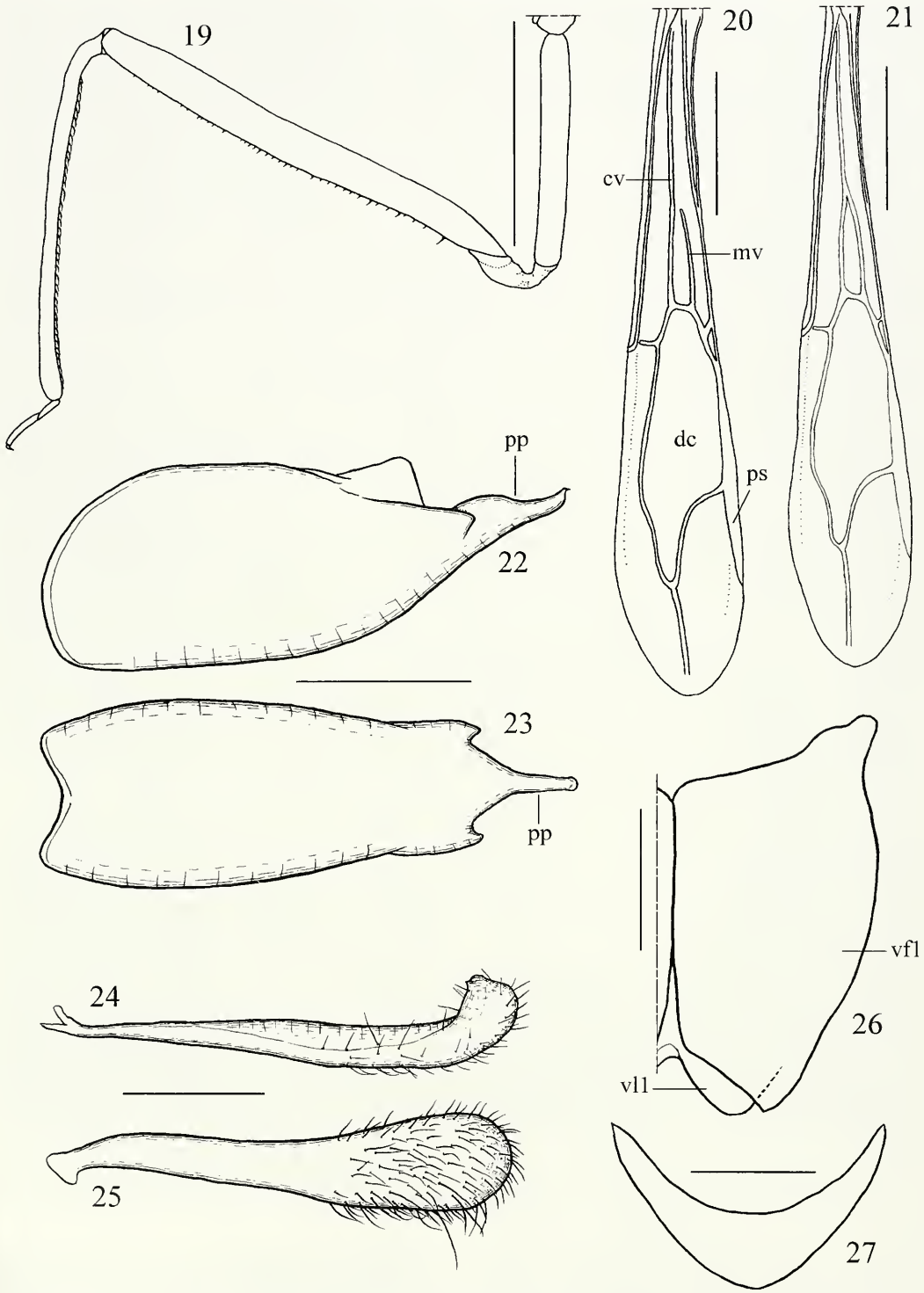
Paratypes.—Java: 1♀, Buring, Malang, Java, 7°59′41″S, 112°39′39″E, ca 515 m alt., 24. VIII. 2005, T. Ishizaki; 4♂ (one shown in Figs. 13–14, 20; other shown in Fig. 21; other shown in Figs. 22–25, 28–30), 3♀ (one shown in Figs. 26–27), same data as for holotype; 1♀, same locality and date as for holotype, T. Ishikawa.

Distribution.—Indoneasia (eastern Java).

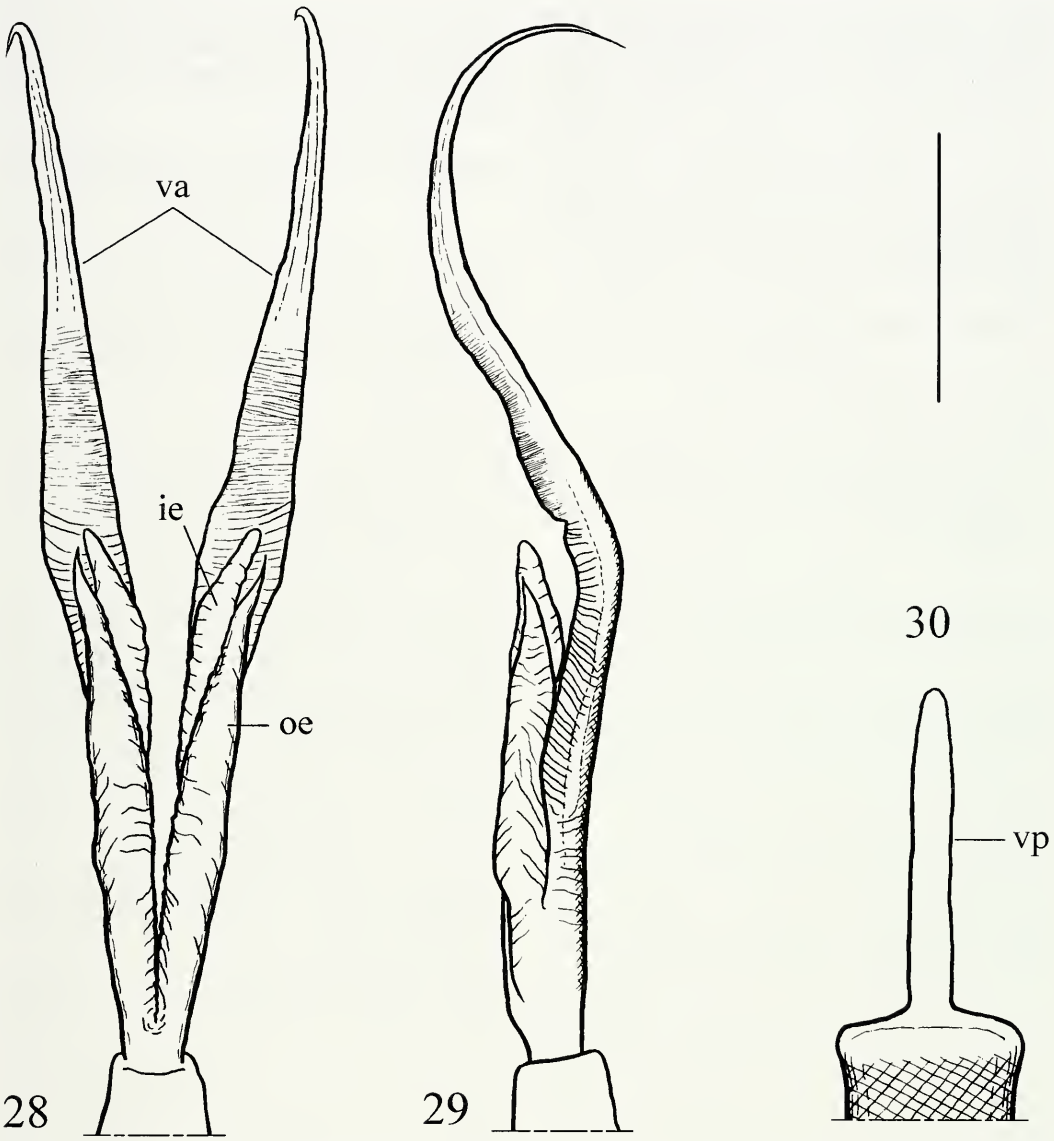
Etymology.—From the Latin, *conjunctus*, (= connected) referring to the hemelytral veins M and Cu connected to the submarginal stripe by transverse markings; an adjective.

Remarks.—In general habitus, this new species resembles *Calphurnioides australis* Wygodzinsky, 1956, known from Australia (Queensland) and Indonesia (Moluccas); however, it can be distinguished from the latter by the antennal segment I not annulated (in *C. australis*, annulated); the tibiae of the mid- and hind legs not annulated (vs. annulated); the submarginal stripe of the hemelytron connected to vein Cu by transverse markings (Figs. 13–14) (vs. not connected); and different shape of the endosoma of the phallus (Figs. 28–29).

In this new species as well as other members of *Calphurnioides*, the hemelytral veins M and Cu extending from the base of a discal cell are generally free and are sometimes connected to each other



Figs. 19–27. *Calphurnioides conjunctus* (setae omitted except for 24–25). 19, Left foreleg, lateral view. 20–21, Right hemelytron. 22–23, Pygophore, lateral (22) and ventral (23) views. 24–25, Left paramere,



Figs. 28–30. Phallus of *Calphurnioides conjunctus*. 28–29, Endosoma, dorsal (28) and lateral (29) views. 30, Apical part of phallosoma, ventral view. Abbreviations: ie, inner expansion; oe, outer expansion; va, vesica arm; vp, ventral projection. Scale: 0.2 mm.

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dorsal (24) and lateral (25) views. 26, Left valvifer I and valvula I, ventral view. 27, Styloides, dorsal view. Abbreviations: cv, Cu vein; dc, discal cell; mv, M vein; pp, posterior process; ps, pterostigma; vf1, valvifer I; vl1, valvula I. Scales: 1.0 mm for 19–21; 0.5 mm for 22–23; 0.2 mm for 24–26; 0.1 mm for 27.

by a brown spot, forming an apparent subbasal cell (Figs. 13–14). Observation of the hemelytra of the paratypes under a compound microscope revealed that veins M and Cu were directly connected to each other, forming a true subbasal cell (Fig. 21) in one of the paratypes. This could be merely an aberration of the venation in this specimen.

Calphurnioides emmesius (McAtee and Malloch)
(Figs. 5–8, 15–16)

Emesopsis (Pseudobolos) emmesius McAtee and Malloch 1926: 120, 125.
Calphurnioides emmesius: Wygodzinsky 1966: 351.

Diagnosis.—This species is recognized by the following characters: body brown to dark brown; pronotum 1.5 times as long as head and 1.5 times as long as humeral width (Figs. 7–8); profemur decorated with median pale annulation, 2.2 times as long as coxa and about 9.5 times as long as its maximum width (Fig. 6); submarginal stripe of hemelytron connected to vein M by a short veinlike marking, but not connected to vein Cu (Figs. 15–16); hemelytral veins M and Cu connected to each other by a brown spot before base of discal cell (Figs. 15–16); and hemelytral discal cell with one conspicuous and one inconspicuous, longitudinal brownish stripes (Fig. 15). Body length ranges from 6.1 to 6.5 mm (n=6).

Material examined.—Bali: 1♂ (Figs. 15–16), Pura Luhur, Muncak Sari, Tabanan, 8°23′05″S, 115°05′10″E, ca 780 m alt., 2. IX. 2005, T. Ishikawa; 1♂, Pura Jero Sasah, near Wangaya, Tabanan, 8°22′09″S, 115°06′25″E, ca 900 m alt., 4. IX. 2005, T. Ishikawa; 2♂, same locality and date as above, T. Ishizaki; 1♂ (Figs. 5–8), Jatiluwih (Peteli Temple), Tabanan, 8°21′40″S, 115°06′53″E, ca 890 m alt., 14. III. 2005, T. Ishikawa; 1♀, Jatiluwih (Peteli Temple), Tabanan, 8°21′40″S, 115°06′54″E, ca 890 m alt., 13. VIII. 2005, T. Ishikawa.

Distribution.—Indonesia (Bali, Irian Jaya); Philippines.

Calphurnioides velutinervis (McAtee and Malloch)
(Figs. 9–12, 17–18)

Emesopsis (Pseudobolos) velutinervis McAtee and Malloch 1926: 120, 124.
Calphurnioides velutinervis: Wygodzinsky 1966: 353.

Diagnosis.—This species is recognized by the following characters: body brownish yellow, with posterior pronotal lobe dark brown to blackish; pronotum 1.3 times as long as head and 1.4 times as long as humeral width (Figs. 11–12); profemur twice as long as coxa and about 7.5 times as long as its maximum width; submarginal stripe of hemelytron directly connected to vein M, but not connected to vein Cu (Figs. 17–18); hemelytral veins M and Cu not connected to each other before base of discal cell (Figs. 17–18); and hemelytral discal cell with two conspicuous, longitudinal brownish stripes (Fig. 17). Body length ranges from 4.1 to 4.8 mm (n=23).

Material examined.—Java: 2♀, Seyegan, Sleman, Yogyakarta, 7°45′57″S, 110°17′15″E, ca 150 m alt., 19. VIII. 2005, T. Ishikawa; 1♀, Sawo Sajar, Sundeng, Malang, 7°57′59″S, 112°39′23″E, ca 450 m alt., 24. VIII. 2005, T. Ishikawa; 3♀, Buring, Malang, 7°59′41″S, 112°39′39″E, ca 515 m alt., 24. VIII. 2005, T. Ishikawa; 1♂, 1♀, Tumpang Malang, 8°01′39″S, 112°46′26″E, ca 690 m alt., 22. VIII. 2005, T. Ishikawa; 1♂, Malang Sari, Kalibaru, Banyuwangi, 8°18′50″S, 113°57′55″E, ca 410 m alt., 27. VIII. 2005, T. Ishikawa; 2♂, 3♀, Kalibaru, Banyuwangi, 8°18′15″S, 114°00′14″E, ca 440 m alt., 26. VIII. 2005, T. Ishikawa; 2♂ (one shown in Figs. 9–12; another shown in Figs. 17–18), 1♀, Sumber Gondo, Tulung Rejo, Glemor, Banyuwangi, 8°19′28″S, 114°04′00″E, ca 300 m

alt., 27. VIII. 2005, T. Ishikawa; 1♂, 4♀, same locality and date as above, T. Ishizaki. Bali: 1♀, Pura Batu Salahan, Bengkel, Tabanan, 8°23′05″S, 115°05′53″E, ca 790 m alt., 3. IX. 2005, T. Ishikawa.

Distribution.—Indonesia (eastern Java, Bali); Philippines.

Key to Species of *Calphurnioides* from Eastern Java and Bali

1. Body length less than 5 mm; pronotum 1.3 times as long as head; hemelytral veins M and Cu not connected to each other before base of discal cell (Figs. 17–18) ..... *velutinervis*
– Body length more than 6 mm; pronotum 1.5 to 1.6 times as long as head; hemelytral veins M and Cu connected to each other by a brown spot before base of discal cell (Figs. 13–16) 2
2. Profemur about 11 times as long as its maximum width; submarginal stripe of hemelytron connected to vein Cu by short veinlike markings (Figs. 13–14) ..... *conjunctus*
– Profemur about 9.5 times as long as its maximum width; submarginal stripe of hemelytron not connected to vein Cu by short veinlike markings (Figs. 15–16) ..... *emmesius*

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